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A correlational analysis of factors available on all students (freshman classes 1947-48 and 1948-49) upon applying to the Medical School with their success in the Medical School. The primary purpose of the study was to investigate the prognostic value of the measures available on all applicants, including data available upon application, data collected during medical school work, and data collected following completion of medical school work (the grade on the State board examination).							
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Prediction of Success in Medical School

(A Study Conducted by the Bureau of Institutional Research
under the direction of O. F. Anderhalter)

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In a previous report, the relation between the institution of pre-medical school training and success in medicine was presented in considerable detail. The primary purpose of that report was to aid in the establishment of differential standards for admission to the medical school--for students doing pre-medical work at different types of institutions.

This report is a supplementary report, involving a correlational analysis of factors available on all students upon applying to the medical school with success in medical school. The primary purpose of this report is to investigate the prognostic value of the measures available on all applicants.

I. Data Available and Population Used

For this study, the freshmen classes from the years 1947-1948 and 1948-1949 were utilized. These groups were selected as being representative of post-war medical students--and still allowed complete availability of success criteria in medical school (as well as state board grades following such training).

For each individual in these groups, the following information was collected and tabulated:

A. Data Available Upon Application

1. Grade point average received in pre-medical school work
2. Number of semester hours of credit in pre-medical school work
3. Score on the General Ability Section of the Medical Aptitude Test
4. Score on the Pre-Medical Achievement Section of the Medical Aptitude Test

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B. Data Collected during Medical School Work

5. Credit point average in all work in Chemistry
6. Credit point average in all work in Physics
7. Credit point average in all work in Biology
8. A composite GPA for work in all sciences
9. The rank in the class at the end of the first year
10. The rank in the class at the end of the second year
11. The rank in the class at the end of the third year
12. The rank in the class at the end of the fourth year

C. Data Collected Following Completion of Medical School Work

13. The grade on the state board examination

II. Selection of Criterion Measures

The problem of a good criterion of success in medicine was of course a difficult one. In the current study it was solved by considering each of the measures in groups B and C (i.e. success in medical school and on the state board examination) as separate criterion measures. This allows determining the prognostic value of each of the pre-measures in-so-far as predicting success in the sciences; or predicting more immediate success in the first several years of medical school; or predicting more ultimate success in the later years of medical school or the state board score.

III. Results of the Analysis

The results of the correlational analysis are presented in Tables 1 and 2 which follow. In Table 1, is given all of the correlations between pre-medical school data and each of the nine criterion of medical success (i.e. the four science measures, the ranks after each of the four years of medical school, and the state board grade). In Table 2 is given the correlations between each

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of the eight medical school success measures and the state board grade. Thus, Table 1 might be considered as giving indications of pre-measures available at the time of admission which might have prognostic value; and Table 2 gives an indication of which of the measures collected during the medical school training might best indicate later success on the state board. It is the results of these two tables which serves as the basis of the discussions to follow.

A. General Notes From Tables 1 and 2

Several facts appear to be indicated in Tables 1 and 2 which might tend to aid in later interpretation of the prognostic value of the measures:

1. It is evident that the state board examination tend to emphasize success in the pure sciences--particularly biology and physics. This can be evidenced by first noting the high correlations between the grade point average in pre-medical work and the science grades in the Medical School (indicating that pre-medical work must best reflect success in the sciences); and next noting the high correlation between this pre-medical grade point average and the state board examination ($r = .834$). It can also be noted from Table 2, that the correlations between biology and state board, physics and state board, and all sciences with state board, are far and away the highest of the correlations in this table.

2. It is also evident that success in the medical school--as indicated by ranking in class--must reflect something other than strict success in the sciences. This is evidenced by glancing at Table 2 and noting the high correlations between the sciences and the state board; yet the relatively low correlations between the ranks in the medical school classes and the state board--thus, the all science grade point average correlates .863 with the state board grade, yet the rank in the class at the end of the four years of medical school training correlates only .351 with the state board grade.

These facts appear to point out the need for an administrative decision as to whether selection and admission policies should be pointed toward selecting

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students likely to succeed on the state board examination; or whether such policies should be pointed toward selecting students likely to do well in the medical school. The low correlations between success in the medical school and the state board—as previously discussed—point out the fact that such policies would differ for the two criteria. In view of these conclusions, the prognostic value of the various measures are considered separately in following discussions.

B. Selection of Candidates Using State Board as the Criterion.

The correlations between the four pre-admission measures and the state board grade, reveal that both the pre-medical school credit point average and the score on the Pre-Medical School Achievement section of the Medical Aptitude test have extremely high prognostic value for predicting state board grades (note correlations in the last column of Table 1). The fact that these two measures reflect fairly independent measures (since the correlation between pre-medical credit point average and the Achievement score on the Aptitude test is only .367), indicates that the use of the two would result in extremely high efficiency in predicting state board grades. The multiple correlation involving these two measures combined, and the state board results in a correlation of .97.

The General Ability of the Medical Aptitude Test is also of considerable value in predicting state board grade, although it is considerably less than the other two measures ($r = .555$). The number of semester hours of work in pre-medical training appears to have only negligible prognostic value for this purpose.

Summarizing, it would appear that the use of the pre-medical school credit point average, along with the score on the Pre-Medical Achievement section of the Medical Aptitude test would result in a surprisingly high efficiency of prediction pointed toward the state board examination grade. The score on the General Ability section of the Medical Aptitude test might serve as a valuable supplementary measure, while the number of hours of work in pre-medical work

would be of little value.

C. Selection of Candidates Using Medical School
Success at the Criterion

Should the selection and admissions policies be based upon how well the student will do in the Medical School, the problem is more difficult, in view of the considerably lower values of almost all of the correlations.

Should success in the science courses in Medical School be the sole criterion, the high correlations between pre-medical credit point average and science credit point averages (.723 with biology .660 with physics, and .848 with combined science grades) would enable satisfactory selection using this pre-medical credit point average as the sole factor under consideration. (Note: the correlations of the other measures with the science grades of considerably lower magnitude).

If the ranking in class—which considers the clinical work, and other phases of training in addition to pure science grades—is the criterion however, it can be noted (from Table 1 again) that none of the pre-admission factors have extremely large (note columns 5, 6, 7, and 8 of Table 1). Excluding the number of semester hours of work in pre-medicine which again shows little prognostic promise, an analysis of the correlations shows that the credit point average in pre-medical, the score on the General Ability test, and the score on the Pre-Medical Achievement test are generally of about the same magnitude in-so-far as being related to the four years rankings. If there is a difference, the General Ability appears to be over-all slightly less valuable than the other two.

It can also be noted, that the three pre-measures in question have about equal prognostic value in predicting fourth year rank and 1st, 2nd, or 3rd year rank. The correlations tend to run slightly (but not significantly) higher for the earlier years. If all three of the pre-measures (excluding the semester hours of credit) were utilized, the multiple correlations with 1st, 2nd,

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3rd and 4th year ranks would be only .457, .483, .437, and .399 respectively.

It consequently appears, that the pre-medical credit point average, the General Ability test score, and the Pre-Medical Achievement test score form the best combination for predicting success in the Medical School; although using all three still does not result in a high degree of predicative efficiency.

D. Selection After Admission into Medical School

In the event that further selection is desirable amongst students in the medical, the results of Table 2 might be of some value. If such selection is done on the basis of who will likely do best on the state board examination, the correlations in this table indicate that the combined science grades would be a better basis than would any of the class rankings. It can be noted that this all science credit point average correlated significantly higher with the state board than does even the rank in the graduating class.

IV. General Conclusions

A number of general conclusions can be drawn from the inferences made on the preceding pages:

1. The fact that the credit point average in pre-medical work (which was shown to be highly saturated with science work), the biology grades in medicine, the physics grades in medicine, and the all science credit point average in medicine all correlate surprisingly high with the state board grade; would tend to suggest that the state board grade is highly saturated with pure sciences.

2. The credit point average in pre-medical work, combined with the score on the Pre-Medical Achievement test and possible the General Ability score, appear to be of maximum efficiency in selection of terms of either the state board grade or the success in the Medical School.

3. The magnitude of the correlations obtained indicates that the use of the three above measures would result in high confidence in predicting state

board grade; but considerable lessened confidence in predicting success in the Medical School.

4. The findings suggest an analysis of both the Medical School curriculum and the state board examination content. It is evident (from the low correlations between rank in Medical School and state board grade) that either the state board measures success in medicine while success in Medical School does not; or, success in Medical School measures success in medicine while the state board does not.

TABLE 1.--Relationship Between Data Available on Medical School Applicant and Various Criteria of Medical School Success in Terms of Product-Moment Coefficients of Correlation.

Pre-Medical Data	Criteria of Success								
	CPA in Chemistry	CPA in Biology	CPA in Physics	Combined Science CPA	1st Year Rank	2nd Year Rank	3rd Year Rank	4th Year Rank	State Board Examination Grade
Grade point average in pre-medical work	.396	.723	.660	.848	.371	.387	.401	.279	.834
Number of semester hours work in pre-medical				.043	.057	.012	.042	.136	.316
Score in General Ability section of Medical Aptitude test				.273	.300	.338	.251	.276	.555
Score in Pre-Medical Achievement section of Medical Aptitude test	.291	.391	.169	.325	.359	.468	.284	.336	.813

TABLE 2.--Correlation Between Medical School Data and State Board

	State Board
Chemistry	.454
Biology	.628
Physics	.831
All Science	.863
1st Year Rank	.379
2nd year Rank	.307
3rd Year Rank	.427
4th Year Rank	.351